

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property
Organization
International Bureau



Rec'd PCT/PTO 20 APR 2005

(43) International Publication Date
6 May 2004 (06.05.2004)

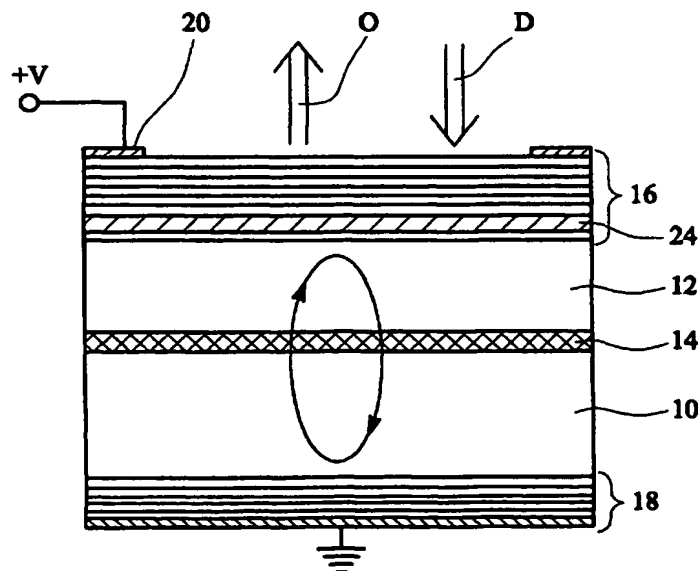
PCT

(10) International Publication Number
WO 2004/038813 A3

- (51) International Patent Classification⁷: **H01L 31/173**, 31/0232, G01N 21/64, H01S 5/026
- (21) International Application Number: PCT/GB2003/004558
- (22) International Filing Date: 22 October 2003 (22.10.2003)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
0224503.3 22 October 2002 (22.10.2002) GB
0300434.8 9 January 2003 (09.01.2003) GB
- (71) Applicant (for all designated States except US): **UNIVERSITY COLLEGE CARDIFF CONSULTANTS LTD** [GB/GB]; 55 Park Place, Cardiff CF10 3AT (GB).
- (72) Inventor; and
(75) Inventor/Applicant (for US only): **SUMMERS, Huw, David** [GB/GB]; 6 Ton-yr-ywen Avenue, Health, Cardiff CF14 4PA (GB).
- (74) Agent: **GIBSON, Steward, Harry**; Urquhart-Dykes & Lord LLP., Three Trinity Court, 21-27 Newport Road, Cardiff CF24 0AA (GB).
- (81) Designated States (*national*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.
- (84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).
- Published:
— with international search report

[Continued on next page]

(54) Title: SEMICONDUCTOR OPTICAL DEVICES



(57) Abstract: A semiconductor optical device (e.g. a resonant cavity device in this form of an LED or a laser) comprises a single substrate arranged for emitting light (O) for incidence on a sample or other element and also responsive to light (D), e.g. of a different wavelength, received back from this sample or other element: the device further comprises means for monitoring a characteristic (e.g. its current-voltage characteristic) which varies in dependence upon the light (D) received back from the sample or other element.



— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(88) Date of publication of the international search report:
20 January 2005

INTERNATIONAL SEARCH REPORT

Int Application No
P 03/04558

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H01L31/173 H01L31/0232 G01N21/64 H01S5/026

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 H01S H01L G01N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2001/046712 A1 (HANG ZHIJIANG ET AL) 29 November 2001 (2001-11-29) abstract; figures 15,16 paragraphs '0066!', '0069!	1-7, 16-24
X	US 5 533 041 A (MATSUDA MANABU ET AL) 2 July 1996 (1996-07-02) column 15, line 18 - column 16, line 30; figures 16-18	1-6
X	US 5 978 401 A (MORGAN ROBERT A) 2 November 1999 (1999-11-02) figure 2	1-8
X	WO 01/26102 A (NEW DIMENSION RES & INSTR INC) 12 April 2001 (2001-04-12) figure 2b	1-5
	----- -/-	

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents :

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
- *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

- *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- *G* document member of the same patent family

Date of the actual completion of the international search

19 November 2004

Date of mailing of the international search report

29/11/2004

Name and mailing address of the ISA
European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax (+31-70) 340-3016

Authorized officer

Le Meur, M-A

INTERNATIONAL SEARCH REPORT

Inte Application No

PC1/GB 03/04558

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5 319 182 A (HAMMOND JR CHARLES M ET AL) 7 June 1994 (1994-06-07) abstract; claim 1	1-15
A	US 5 679 964 A (MATSUDA KENICHI ET AL) 21 October 1997 (1997-10-21) abstract	1-15
A	US 6 370 176 B1 (OKUMURA TOSHIYUKI) 9 April 2002 (2002-04-09) abstract	11,14,15
A	PATENT ABSTRACTS OF JAPAN vol. 0070, no. 17 (E-154), 22 January 1983 (1983-01-22) & JP 57 173984 A (TATEISHI DENKI KK), 26 October 1982 (1982-10-26) abstract	1-18

INTERNATIONAL SEARCH REPORT

onal application No.
rCT/GB 03/04558

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this International application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☒ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/SA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-18

Integrated optical emitter/detector with monitoring means.

2. claims: 19-24

Device for the analysis or testing of a sample, the device comprising a single emitter and a single receptor.

INTERNATIONAL SEARCH REPORT

Inteq Application No
PCT/GB 03/04558

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2001046712 A1	29-11-2001	AU 4003901 A CN 1311436 A WO 0165242 A1	12-09-2001 05-09-2001 07-09-2001
US 5533041 A	02-07-1996	JP 6069491 A FR 2694988 A1	11-03-1994 25-02-1994
US 5978401 A	02-11-1999	NONE	
WO 0126102 A	12-04-2001	AU 7997000 A WO 0126102 A1 US 6614825 B1	10-05-2001 12-04-2001 02-09-2003
US 5319182 A	07-06-1994	CA 2131465 A1 DE 69310900 D1 DE 69310900 T2 EP 0629315 A1 EP 0764916 A1 JP 7505976 T WO 9318555 A1	16-09-1993 26-06-1997 05-02-1998 21-12-1994 26-03-1997 29-06-1995 16-09-1993
US 5679964 A	21-10-1997	JP 8078656 A	22-03-1996
US 6370176 B1	09-04-2002	JP 2000058915 A	25-02-2000
JP 57173984 A	26-10-1982	NONE	